MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

ERT2016 - ENGINEERING MECHANICS

(RE)

2 MARCH 2017
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1.This exam paper consists of only four printed pages, including this cover page.

2. Answer all questions.

3. Write all your answers in the answer booklet provided.

Question 1

a). A 10-kg sphere of radius 30 cm is tied at its circumference to a piece of 20-cm light inextensible string. The other end of the string is fixed to a smooth wall, as shown in Fig. 1a. Calculate the reaction of the wall upon the sphere and the tension in the string.
[13 marks]

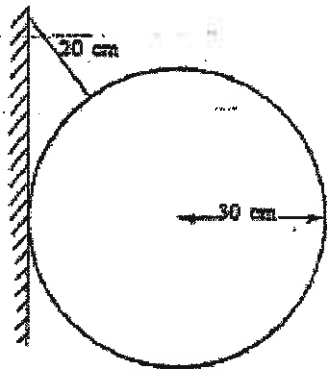

Figure 1a

b). Determine the reactions at A and C for the pin-connected structure (BD = 1 m, ED = 2.6 m, DC = 2.4 m) shown in Fig. 1b. [12 marks]

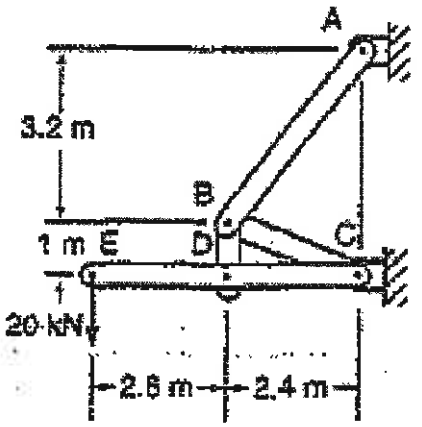

Figure 1b

Continued . . .

Question 2

a). The 50-kg mass, shown in Fig. 2a, has impending motion upward when P is 750 N. Determine the coefficient of friction between the rope and the cylinder. [13 marks]

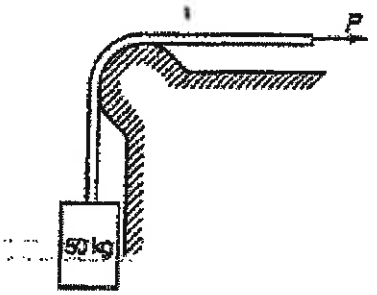

Figure 2a

b). Calculate the centroid of the shaded area shown in Fig. 2b. [12 marks]

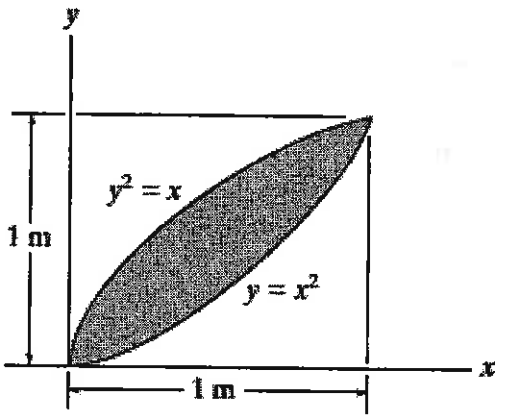

Figure 2b

Question 3

a). A particle P of mass m is attached to a fixed point O by a light inextensible string of length l, and to another fixed point Q, a distance of $2h$ directly below O, also by a light inextensible string of length l. The particle moves in a horizontal circle, with both strings taut, at a constant angular speed ω. Find the tension in the lower string PQ in terms of m, l, h, ω, and g; and deduce the minimum value of ω. [13 marks]

b). Fig. 3b shows a car of mass 1000 kg turning a curved banked road of radius of curvature 200 m at a speed of 30 m/s. Find the bank angle so that the car can go safely round the curve without having to rely on friction. [12 marks]

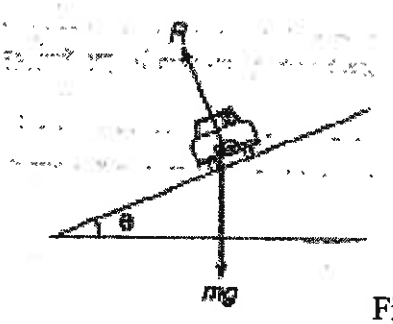

Figure 3b

Continued . . .

Question 4

a). The bar *BC* shown in Fig. 4a has an angular velocity of 3.73 rad/s clockwise. Determine the angular velocity of *AB* and the velocity of the piston at *A*. [13 marks]

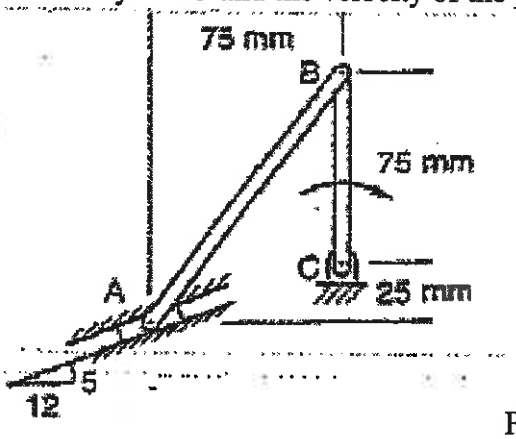

Figure 4a

b). The figure shown in Fig. 4b shows a uniform square plate with five axes. The point *O* is the center of mass of the plate. Compare the moments of inertia of the plate through these five axes; arrange the magnitude of the moments of inertia in descending order. [12 marks]

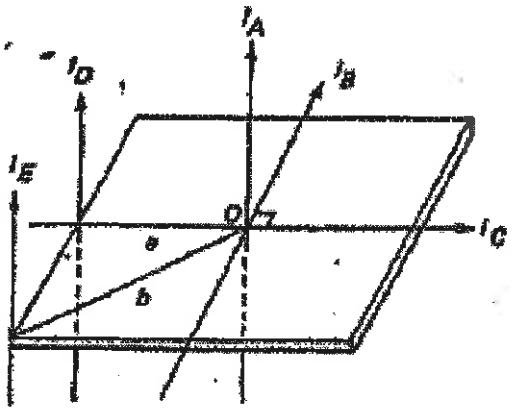

Figure 4b

End of Paper